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NAS CECIL FIELD  
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LETTER AND COMMENTS FROM U S EPA REGION IV REGARDING DRAFT PROPOSED  
PLAN FOR OPERABLE UNIT 2 (OU2) NAS CECIL FIELD FL  
8/30/1995  
U S EPA REGION IV

4.2.5

FILE



## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

345 COURTLAND STREET, N.E.  
ATLANTA, GEORGIA 30365

August 30, 1995

4WD-FFB

Mr. Steve Wilson  
Department of the Navy  
Southern Division  
NAVFAC  
Code 1889  
2155 Eagle Drive  
N Charleston, SC 29411-0068

Dear Mr. Wilson:

Enclosed are the Environmental Protection Agency Comments on the Draft Proposed Plan for Operable Unit 2 at NAS Cecil Field. Please address these comments and submit the Proposed Plan for approval.

Should you have any questions, please contact me at (404)347-3555 extension 2049.

Sincerely,

A handwritten signature in dark ink, appearing to read "Bart Reedy", is written over the typed name and title.

Bart Reedy, RPM  
Base Realignment and Closure Team  
Federal Facilities Branch

Enclosure

cc: Mike Deliz, FDEP  
Rao Angara, ABB

- 1 -

**HEALTH**

- I. I have already discussed these criticisms with you. I believe the contractor should have the first attempt at altering the document, and, hence, in my comments below I have refrained from suggesting specific wording for the changes. I am certainly willing to help rewrite the document if you feel I could help in that way.
- II. **Tone of the document.** The reviewer realizes that the contractor attempted to pitch the proposed plan at a level appropriate for the general public. However, in some instances, the tone and lack of detail seemed somewhat condescending ; it felt like "proposed plan lite". The general suggestions below should help this problem.
- III. **Summary of Previous Investigations.** This section should be condensed. The most important investigation is the current RI and it should receive the most space.
- IV. **Description of the RI.** At the end of this section, it says:

The objectives of the RI were met and sufficient data were gathered to complete the BRA and the FS.

Prior to this is a bulleted list of the tasks of the RI. Nowhere are the results of the RI discussed. Details should be given and this section should be expanded.

- V. **Baseline Risk Assessment.** The description of the human health risk assessment should be expanded and give details of risk assessment methodology.
- VI. **Ecological Risk.** It says:

Suppression of the benthic macroinvertebrates may be the result of unfavorable physical conditions such as coating of gills resulting from increased turbidity of the water, rather than as a response to specific chemicals.

- 2 -

The qualified way in which this conclusion is presented make the document seem wishy-washy. After all, this is the basis of the extant risk at the site. In addition, the reviewer believes a more detailed discussion of this situation would be appropriate. This discussion should mention that the identify of the iron-loving bacteria that produce the red flocculent material is unknown and is considered a data gap.

- VII. Figures 4 through 9. The reviewer thought these figures were an excellent way to present the remedial alternatives. However, the accompanying text was very scant. One possible suggestion is to provide a text box within the white space in each figure that gives details of the alternative and the pros and cons.
- VIII. Table 2. The statement under Additional Activities to "Develop Closure Plan" is vague. More specifics should be provided.
- IX. Preferred Alternative. The preferred alternative is RR-1, biomonitoring. During previous discussions with the RPMs from EPA, FDEP, the BEC and the Navy contractor, the possibility of "seeding" the stream with the appropriate biota to compete with the iron-loving bacteria that are producing the red flocculent material. This novel possibility should be mentioned briefly in the proposed plan.

## DYNAMAC

- X. The Draft Proposed Plan is a well-written document that presents historical information on OU 2, identifies potential remedial alternatives for the cleanup of contaminated sediment and groundwater and discusses the selected remedies for both Site 5 and Site 17.
- XI. Dynamac Corporation (Dynamac) developed the following general comments from its review of the Draft Proposed Plan:

Contaminants of concern, such as phenol, 2-methyl phenol, 4-methyl phenol, as well as metals were detected in groundwater at sites 5 and 17 which may be well distributed vertically throughout the entire depth of the saturated aquifers and probably down to the confining beds. Therefore, quantitative data should be included in the Draft Proposed Plan which characterizes the vertical distribution of contaminants, and remedial alternatives should be designed with respect to vertical distribution of

- 3 -

contaminants. For example, the air sparging and air stripping systems should be placed at the bottom of the plume in order to ensure that denser contaminants are removed.

The present design of the groundwater treatment systems is based on the analysis of unfiltered, highly turbid samples. Inorganic constituents, such as those detected in groundwater samples, may be present due to adsorption to clay or silt particles and may not be as much of a concern as they appear. For both sites 5 and 17, the presence of very turbid groundwater in samples indicates silty and clayey sediments and poor well construction and development. To minimize turbidity, a complete low-flow groundwater filtered sampling program (less than 1 liter per minute) should be conducted and metals analyses should be compared with existing data before final treatment technologies are selected.

**XII. Page 7, Section 2.0, Column 1, Paragraph 1:**

The text states that several inorganic constituents were identified in groundwater at sites 5 and 17 which are believed to be naturally occurring and not related to releases from wastes at these sites. As a result, the remedial alternatives presented for groundwater in the Draft Proposed Plan do not address the human health and ecological risks posed by the presence of inorganic contaminants in the environment, which is inadequate. The text indicates that the presence of inorganic constituents were the result of adsorption to silt and clay particles "Inadvertently suspended in groundwater samples collected during the remedial investigation" and then concludes that groundwater "samples will be collected prior to the Record of Decision (ROD) to confirm that inorganics are not present in groundwater" as a result of release. This subsequent confirmation sampling should be conducted prior to developing remedial alternatives, rather than prior to issuing the ROD as stated in the Draft Proposed Plan. To minimize the turbidity that may be affecting metals concentrations, a complete low-flow groundwater filtered sampling program (less than 1 liter per minute) should be conducted. Metals analyses should then be compared with existing analytical data before designing and selecting treatment technologies.

**XIII. Page 12, Section 3, Table 2:**

Table 2 presents remedial alternatives for OU 2 sediment. Alternative SD-2, Excavation and Biological Treatment, which is proposed at Site 5 will generally be most effective for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), petroleum hydrocarbons and some chlorinated solvents (combined aerobic and anaerobic treatment). However,

- 4 -

biological treatment will be ineffective for the following contaminants of concern detected in sediment at Site 5 which pose ecological risks: DDT and polychlorinated biphenyls (PCBs). Biological treatment may be somewhat effective on low-chlorine PCBs, such as Aroclor-1254; however, the PCBs detected at Site 5 are Aroclor-1260, which have a higher percentage of chlorine, and the effectiveness of biodegradation is of concern. The Draft Proposed Plan should address effectively reducing the ecological risks posed by both DDT and PCBs.

**XIV. Page 13, Table 3:**

Table 3 presents remedial alternatives for OU 2 groundwater. All of the alternatives proposed for both Site 5 and Site 17 will generally be most effective for treating or removing VOCs, and to a lesser extent some SVOCs. However, the technologies will be ineffective for the following contaminants of concern detected in groundwater at sites 5 and 17 which pose human risks: chlordane, beta-hexachlorocyclohexane (HCH), arsenic, antimony, beryllium, cadmium, chromium, manganese and vanadium. The Draft Proposed Plan should address effectively reducing the human health risks posed by all contaminants of concern.

**XV. Page 14, Section 3.0, Column 1, Paragraph 1:**

The text describes natural attenuation as a potential groundwater remediation alternative to be implemented at both sites 5 and 17. This alternative involves no direct intervention, but relies on natural biodegradation and dispersion to reduce concentrations of contaminants of concern, such as methylene chloride, trichloroethylene (TCE), phenols and several metals in the groundwater. The effectiveness of natural attenuation is of some concern since ABB ES assumes that biological degradation is currently very active, and this assumption has not been quantitatively supported.

**XVI. Page 14, Section 3.0, Column 1, Paragraph 2:**

The text describes air sparging as a groundwater remediation alternative to be implemented at Site 5. Available guidance indicates that there is some concern regarding the effectiveness of air sparging in removing SVOCs. Most SVOCs will respond to air sparging, but at much slower rates than VOCs since VOCs easily evaporate. Regarding the effectiveness of air sparging in treating or removing contaminants of concern in groundwater at Site 5, see Specific Comment XIV.

- 5 -

**XVII. Page 14, Section 3.0, Column 1, Paragraph 5:**

The text describes air stripping as a groundwater remediation alternative to be implemented at Site 5. Available guidance indicates that there is some concern regarding the effectiveness of air stripping in removing SVOCs. Most SVOCs will respond to air stripping, but at much slower rates than VOCs, since VOCs easily evaporate. Regarding the effectiveness of air stripping in treating or removing contaminants of concern in groundwater at Site 5, see Specific Comment XIV.

**XVIII. Page 22, Section 5, Column 2, Paragraph 2:**

The text states that sediment remedial alternative SD-2, Excavation and Biological Treatment, was selected to remediate contaminated sediment at Site 5. Regarding concerns with this alternative, see Specific Comment XIII.

**XIX. Page 22, Section 5, Column 2, Paragraph 4:**

The text states that a combination of groundwater remedial alternatives (GW-3, air sparging, and GW-6, air stripping), were selected to remediate contaminated groundwater at Site 5. Regarding concerns with these alternatives, see Specific Comment XVII and XVIII.

**XX. Page 23, Section 5, Column 1, Paragraph 1:**

The text states that groundwater remedial alternative GW-2, natural attenuation, was selected to remediate contaminated groundwater at Site 17. In addition to methylene chloride, trichloroethylene (TCE) was detected in groundwater at Site 17. TCE does not readily degrade under aerobic conditions and typically requires anaerobic conditions for reductive dechlorination to occur. A major problem inherent in the degradation of TCE is the formation of vinyl chloride, which is more toxic than TCE. Research has shown that less toxic products of biodegradation such as cis-1,2-Dichloroethene (cis-1,2-DCE) accumulate preferentially when TCE biodegrades under oxygen-limiting conditions, rather than anaerobic conditions. The cis-1,2-DCE is less hazardous than vinyl chloride and is more amenable to aerobic biodegradation. Oxygen-limiting conditions can be achieved by adding both oxygen and methane to maintain very low oxygen levels in the groundwater. Aerobic methanotropic bacteria, which utilize methane as a food source, can biodegrade TCE and vinyl chloride.

In its final design, ABB ES should include a discussion of a monitoring system to ensure that natural attenuation is performing adequately. The

- 6 -

monitoring system should include interior wells to monitor the plume and guardian wells at the outside edge of the plume to monitor plume movement. Groundwater from interior wells should be monitored for concentrations of contaminants of concern as well as the following:

- Dissolved oxygen to determine if one or more of the organic contaminants is biodegrading aerobically;
- Nitrate and dissolved iron to determine the extent of anaerobic biodegradation;
- Reduction-oxidation (redox) potential to determine bacterial decomposition since negative redox potential indicates significant decomposition;
- Carbon dioxide to evaluate the extent of bacterial respiration;
- pH since biodegradation is most effective within a pH of between 5 and 9; and
- Total organic carbon to assess the oxygen demand exerted by the contaminant plume

Monitoring these parameters will indicate if natural attenuation is effectively biodegrading contaminants.

## **GROUNDWATER**

- XXI. Remedial Alternative GW-2, natural attenuation, has a predicted 15-year time frame to attain the remedial action objectives. There are no reliable calculations in either the Remedial Investigation (RI) or Feasibility Study (FS) reports which support this remedial time frame.
- XXII. The projected remedial time frame for natural attenuation is based on literature values of organic contaminant degradation rates (OU2 FS Report Section 7.5.1). While such data may provide rough estimates of site-specific organic degradation rates, this estimation approach leaves a great deal of uncertainty about the effectiveness of natural attenuation for attaining the remedial action objective at either site 5 or site 17 of OU2 within a reasonable amount of time. In order to adequately define the

- 7 -

biodegradation element of natural attenuation at sites 5 and 17, a site-specific study of both the ongoing extent of biodegradation and the suitability of site 5 and site 17 for biodegradation would be necessary. Such a study would include such areas of interest as an investigation of microbial nutrient availability, a definition of ground water oxygen concentrations, identification and study of contaminant-degrading microbes, the presence of microbial degradation byproducts in the ground water, and so forth. Without such a site-specific study, the effectiveness of natural attenuation as a ground water remedial process is unknown, relative to more active ground water remedial actions discussed in the OU2 FS Report.

XXIII. In Section 7.5.1 of the OU2 FS Report, the presumption that natural attenuation is a significant process at Site 17 appears to primarily be based on the apparent retardation of ground water contaminant migration, relative to the estimated average ground water velocity in the uppermost part of the surficial aquifer.

XXIV. This estimated average ground water velocity is subject to some uncertainty regarding its accuracy. For example, in the RI Report, the median hydraulic conductivity and hydraulic gradient of the uppermost part of the surficial aquifer could have reasonably been used rather than the arithmetic averages of these variables to estimate the average annual ground water velocity. Also, a large value of the effective porosity of the surficial aquifer is possible. Considering the median values of 2.16 ft/day hydraulic conductivity and 0.00625 hydraulic gradient, if the effective porosity of the aquifer is assumed to be 0.3 rather than 0.25, the annual ground water velocity is predicted to be 16.425 ft/year. This value is considerably less than the 26 ft/year average ground water velocity reported in Section 5.2.3 of the OU2 RI Report. With these reasonable alternative estimates of the variables influencing ground water velocity, the estimated distance of contaminant migration since ground water contamination began at site 17 would be 328.5 feet, rather than the 510-foot distance estimated in Section 5.2.3 of the OU2 RI Report. That section of the RI Report itself notes that uncertainties in the estimated ground water velocity, such that the actual distance conservative ground water contaminants may have moved downgradient of the site 17 source area could be less than either of these estimates of the average ground water velocity. With less contaminant retardation predicted, the degree of natural attenuation presumed for site 17 would be presumed to be proportionately less.

- 8 -

- XXV. Clearly, based on the analysis presented above, the effectiveness of natural attenuation as a ground water remedial process at site 17, relative to the active ground water remedial action alternatives, is questionable. This uncertainty should be fully reflected in the Proposed Plan's presentation of the natural attenuation ground water remedial time frame (i.e. Figure 8) and in the comparative discussion of the ground water alternatives in Section 4.2 of the Proposed Plan.
- XXVI. As a general comment, any remedial alternative which relies primarily (or as a critical element) on bioremediation, without a critical, site-specific analysis of the potential bioremediation effectiveness, is typically viewed unfavorably by EPA in the selection of remedial alternative. This policy is particularly correct in cases where the risk assessment indicates that potential risks from exposure to ground water are well above EPA's acceptable carcinogenic risk range and the acceptable hazard index is greatly exceeded.
- XXVII. To summarize my concern about the natural attenuation alternative (selected in Section 5.0 of the Proposed Plan as the preferred alternative for site 17), there is inadequate information presented in the RI and FS reports for OU2 to document the effectiveness of this process as a remedial alternative, relative to more active remedial responses to ground water contamination. The mechanisms of natural attenuation are inadequately quantified for the OU2 areas. Because natural attenuation encompasses several processes such as contaminant volatilization, biodegradation, sorption, dispersion, and/or precipitation, it is important to understand the degree to which each process is important at a particular location. Some type of natural attenuation occurs to some extent at every site where there is contaminated ground water. Thus, the natural attenuation of ground water contaminants is not disputed as a process occurring at either site 5 or site 17 of OU2. However, the relative effectiveness of natural attenuation as a ground water remedial process, and the specific factors which result in natural attenuation, are in question for the two OU2 sites.
- XXVIII. I recommend that if natural attenuation is considered as either a possible remedial alternative or as an element of a ground water remedial alternative at site 17, site 5, or elsewhere, Dr. John Wilson, EPA's expert on bioremediation of ground water contaminants, should be consulted. He is at the Robert S. Kerr laboratory in Ada, Oklahoma. There is also a recent article in Environmental Science and Technology (Vol. 28, No. 5, 1994, pages 769-775) which may provide useful information on the types of

- 9 -

organic contaminant (primarily chlorinated solvents) biodegradation indicators which should be investigated or considered in the evaluation of natural attenuation.

XXIX. Considerations (not presented in the Proposed Plan) of an OU2 site 17 ground water remedial action which combines a short-term active ground water remedial action with a more long-term natural attenuation biodegradation remedial action may be ill advised. This process may result in too rapid a removal from the ground water of the nutrient mass necessary to maintain a viable population of degrading microbes. Conversely, certain organic compounds could be toxic to microorganisms at high concentrations. Treatability testing, site analysis, and consultation with experts on bioremediation are probably necessary before proceeding with any such plans.

## **ECOLOGY**

XXX. The recommended remedial alternatives for sediment and ground water appear to be acceptable with respect to ecological concerns. However, the descriptions of remedial alternatives SD-2 and SD-3 should indicate whether the excavated areas will be backfilled with clean sediment (i.e., to reflect the original grade) and revegetated with wetland plants.